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University of Bahrain
Department of Computer Engineering

ITCE311 Introduction to Networking — Wednesday 11 May, 2005
Mid-term Exam II — Time: 60 minutes

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Q1) LIST FORMAT (8 x 1½ mark)

List the items that may constitute the elements for the following

a) A co-axial cable has the following layers:
   i.
   ii.
   iii.

b) The modes of signal propagation in optical fiber cables are:
   i.
   ii.
   iii.

c) The wireless waves used with unguided media are:
   i.
   ii.
   iii.

d) The propagation types of wireless transmission are:
   i.
   ii.
   iii

e) Types of antennas used in wireless transmission are:
   i.
   ii.
   iii.

f) The usable bandwidth of ADSL is divided into:
   i.
   ii.
   iii.

g) SONET transmission relies on three basic devices:
   i.
   ii.
   iii.

7½

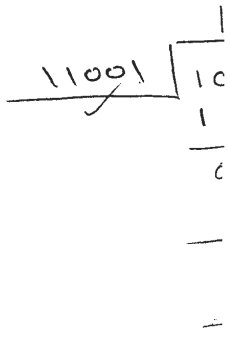
h) The main flow and error control mechanisms used for data-link control are:
i.

ii.

iii.

Q2) A message M = 1010001101 is to be transmitted using CRC error detection with the divisor polynomial $G(x) = x^4 + x^3 + 1$. Find the transmitted frame T.

(7 marks)



64 kbps

VT 1.5
VT 2
VT 3
VT 6
6.3

Q3) A) Sketch a SONET STS-1 frame, and then find the following:
i. The data rate of synchronous payload envelope SPE
ii. The duration of one frame
iii. The number of voice-channels that can be carried by one frame

B) A company wants to use SONET to multiplex up to 120 digitized voices. Which VT (or combination of VTs) is suitable for this company?

(7 marks)

Q4) Draw the sender and receiver windows for a system using Selective-repeat ARQ with a window size W= 4, given the following:

a. Frame 0 is sent; frame 0 is acknowledged
b. Frames 1, 2, and 3 are sent; frames 1 and 2 are acknowledged
c. Frames 4 and 5 are sent; timer for frame 3 expires
d. What shall happen next? Show using your diagram.

(1+2+2+2 = 7 marks)

Data rate = 10 Mbps

Q5) It is desired to send a 3 Mbyte file across a 2-km fiber-optic channel using stop-and-wait protocol. The maximum frame size is 1200 bits (inclusive of 150 bits overhead) and the acknowledgement frame has 160 bits. Determine the total time required to transmit the file. *Assume the channel to be error-free and the propagation speed over fiber-optic cables to be* 2×10^8 *m/s.*

(7 marks)